

Antecedents of
Organizational Creativity and Innovation
- A differentiating perspective



Cecilie Flaatin
Master's Degree Programme in Psychology
University of Oslo

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ABSTRACT

There is an intuitive understanding within the research field of organizational creativity and innovation that the two phenomena are closely related. The literature is even to a large extent characterized by an interchangeable use and operationalization of the two concepts. This study attempted to separate the two and investigate different antecedents that have been identified in the literature as important for both organizational creativity and innovation. The attempt was more concretely to investigate these prerequisites along two pathways with clearly differentiated operationalizations of the two concepts. The antecedents investigated were *risk tolerance*, *leader- member- exchange*, *access to resources* and *constructive controversy*. Regression analysis indicated that the different factors might have varying impact on respectively organizational creativity and innovation. While constructive controversy and leader-member-exchange had a positive effect on creativity, access to resources showed a strong positive effect on innovation. Lastly, risk tolerance had a positive effect on both creativity and innovation.

INTRODUCTION

The organizational literature holds numerous statements on the necessity of organizational creativity and innovation. To gain a competitive edge (Oldham & Cummings, 1996; Mumford, Scott, Gaddis & Strange, 2002; Shalley, 1995; Tierney, Farmer & Graen, 1999) and ultimately to survive in today's market (Scott & Bruce, 1994; West, Hirst, Richter & Shipton, 2004; Westwood & Low, 2003) is the main rationale behind these statements. A starting point for this study is the widespread assumption that there exists a strong relation between creativity and innovation. It is common among researchers to define creativity and innovation as two different concepts, more specifically that creativity involves the generation of new ideas, while innovation is the implementation of those ideas or original solutions (Amabile, 1996; Mumford & Gustafson, 1988; Mumford et al., 2002; Scott & Bruce, 1994; West, 2002; West et al., 2004; Woodman, Sawyer, Griffin, 1993). Still, there is a tendency to use the terms interchangeably (Ford, 1996). Creativity and innovation are therefore not only closely related, but also at times entangled in the scientific literature. For instance, Anderson et al. (2004, p.149) specify in the introduction of their state- of-the-science-overview *that “we are concerned exclusively with workplace innovation and therefore exclude studies of individual and group creativity from our analyses and review commentary”*. Nevertheless, they refer to a study by Tierney et al. (1999) that is exclusively related to creativity, as support for the notion that leader-member-exchange is positively related to *innovations*.

A baseline question is whether the relation between the two concepts is accurate or too strongly emphasized. Despite the mutual importance the two concepts have been given, the research on creativity and innovation have predominantly been brought out within different disciplines; innovation within economics, engineering and sociology, while psychology is by far the most important field for creativity research (Ford, 1996). Findings regarding either of the two have none the less been transferred and connected to the other, apparently without little discussion. It has however been commented that the operationalization of the two concepts lacks a demarcation in many empirical studies (West et al., 2004). The mix of measures which assess idea generation or implementation, results in a confusion of what specific factors may predict and facilitate the generation of ideas on the one hand, and the implementation and adaptation of those ideas on the other hand (op cit.). West et al. (2004) stress that some influential factors have different consequences for creativity and innovation and that it is therefore important to separate the operationalizations of the concepts in empirical investigations.

BACKGROUND

Defining Creativity

Two criteria are often applied when defining creativity; the response must be perceived as both (1) novel or original and (2) appropriate, correct, useful or valuable (Amabile, 1996; Oldham & Cummings, 1996; Milgram, 1990; Mumford & Gustavson, 1988; West, 2002). These criteria reflect the fact that researchers during the past two or three decades, predominantly have defined creativity as an outcome (Amabile, 1996; Gilson & Shalley, 2004; Oldham & Cummings, 1996; Mumford & Gustavson, 1988; Tierney & Farmer, 2002). The outcome approach implies an examination and evaluation of ideas, responses, products, services or solutions (Amabile, 1996; Oldham & Cummings, 1996; Milgram, 1990; Tierney and Farmer, 2002) rather than the process that leads to the generation of such outcomes. Researchers who define creativity as a process, will on the other hand focus on the creative act as such; the generation of ideas are investigated rather than the final outcome of the process (Drazin et al., 1999).

Amongst others, Amabile (1996) has argued that an outcome approach is a more feasible form of creativity evaluation. The two criteria for evaluating creative responses are however to some extent contradictory because something entirely new might not be easily perceived as neither useful nor be fully valued by the environment. According to Lubart and Sternberg's investment theory of creativity, the dynamic of creative production lies in the creative thinkers ability to seek out and stand by undervalued ideas which they later sell high when the tides have turned (Sternberg & Lubart, 1995). These researchers refer to evidence that creative ideas often are initially rejected. Amabile (1991) has even commented that her technique for assessing creative outcomes cannot be used to evaluate products that might be "*at the frontiers of a domain*", where there is bound to be great disagreement whether a new idea is highly creative or simply bizarre" (Amabile, 1991, p. 66). These remarks and findings indicate that a combination of the novelty and utility criterion can be problematic. Furthermore, it is possible to argue that the usefulness and value of a new idea within an organizational setting, ultimately will be reflected in the level of success for the *innovation*. In the present study a creative idea will therefore be defined as something novel and original and not encompass the utility criterion.

Defining Innovation

The potential outcome of creative work within an organizational setting will here be perceived as an innovation. This interpretation corresponds with the differentiation of the two concepts where creativity is defined as the generation of novel ideas while innovation is the application of those. As an extension of this way of defining the two concepts, innovation has been regarded as the result of a two-stage process where idea generation – consequently creative work, predominantly takes place at the early stage, followed by the implementation stage (West, 2002). The notion that creativity and innovation have different contents is supported here, but this does not necessarily imply an orderly two-stage process. As suggested by Paulus (2002), it is just as plausible that the process encompasses a continual cycle of idea generation and attempts of implementation until a successful application is reached. Anderson et al. (2004) supports this notion, stressing that the innovation process is more likely to be cyclical than linear. The two phenomena might in addition exist relatively independent of the other. Creative ideas are found without being put into use, and some innovations are introduced without being the result of new ideas. Several researchers (Anderson, De Dreu & Nijstad, 2004; West & Anderson, 1996; Woodmann et al., 1993) have concluded that innovations may encompass the adaptation of pre-existing products or processes that is new to the setting and not to the domain as such. Innovations can therefore vary on a continuum from rather minor adaptations or adjustments, to truly significant one's which alters the premises of a certain area (West, 2002). More specifically, innovation outcomes can be judged and differentiated according to their level of novelty and radicalness, magnitude and organizational effectiveness (West & Anderson, 1996; West, 2002; West et al. 2004).

It has further been suggested that innovations can be distinguished as a particular form of organizational change by applying the following criteria; innovations are intentional rather than accidental, designed to benefit and new to the social setting of adaptation (West & Anderson, 1996; West, 2002; West et al. 2004). The criterion of benefit refers to various aspects within the organization like efficiency, staff well-being, or increased communication, but it also refers to improvements, which can benefit the society at large (West & Anderson, 1996). To uphold both a separate definition and operationalization of the two concepts is a primary concern in this study. Hence, factors that have been assessed to promote both organizational creativity and innovation will be looked at from a differentiating perspective by keeping the two concepts apart.

Antecedents of Organizational Creativity and Innovation

Research on creativity has followed a developmental path from initially focusing on individual characteristics, to redirect the focus on the interaction between individual and contextual factors (Williams & Yang, 1999). It has been acknowledged that even though innovations arise from individual talents, the ultimate manifestations of those also depend on a variety of different factors in the environment (Amabile, 1996). Consequently, a number of various environmental factors have been connected to both organizational creativity and innovation. (Shalley and Gilson, 2004; West 2002; West et al., 2004). Drawing on the different operationalizations of the two concepts where creativity is the generation of ideas, and innovation is the application of those, it is possible to anticipate that some contextual factors may have different importance and impact on respectively organizational creativity and innovation. My suggestion is that the act of posing new ideas is more challenging on an individual level since the first initiative to take a different course or approach must be presented by an individual in the organization. Moreover, new ideas will on most part, derive from personal points of views and inferences, which might be challenging to present to others. As enlightened by the research of Lubart & Sternberg (1995) new ideas are often rejected and undervalued. Their findings therefore imply that suggesting something new often can lead to negative feedback and a feeling of being dismissed. At the implementation stage, the ideas have reached some general level of acceptance and most probably increased in value, and this stage can therefore be anticipated to be less personally challenging or threatening. Furthermore, I assume that the innovation act of implementation is more resource intensive and more strongly relying on technological skills and equipment. In order to explore the usefulness of such a differentiating perspective, I have examined the following four factors that have previously been described as predictors of both organizational creativity and innovation in the research literature: constructive controversy, access to resources, tolerance for risk, and leader-member-exchange. *Constructive controversy* is predicted to promote a climate with a low threshold for presenting new ideas. *Access to resources* addresses the assumption that the actual need for various resources is not equal for creative and innovative work. Additionally, I will explore risk taking; based on prior reports, my suggestion is that the willingness to engage in risks will have a vital impact on the more personally challenging idea generation stage. Lastly, scholars like Schein (1992) and Yukl (2002), have argued that leader involvement is an absolute necessity in order to bring about change in an organization. I have therefore included *leader-member-exchange*; a leadership theory that has been empirically tested for both creative and innovative work. This form of leadership is predicted to be most

inductive for creative work characterized by a high quality relationship between leader and employee that might create the necessary trust and confidence for posing new ideas. Taken together, a potentially differentiated impact of these factors through the innovation process can be illustrated in the following manner:

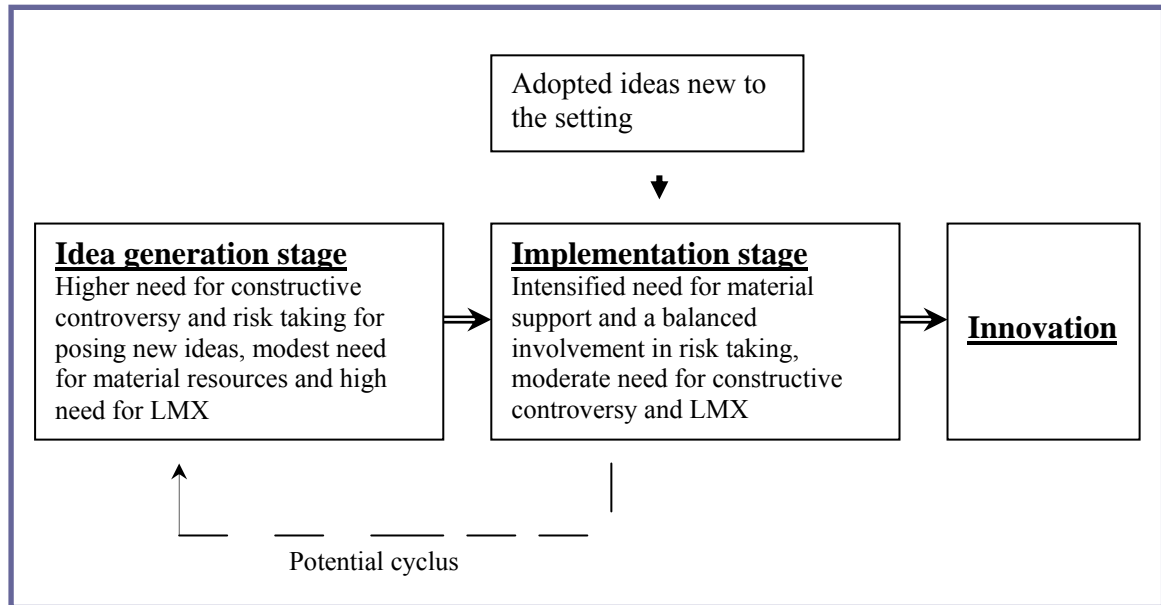


Figure 1: A differentiating perspective on the innovation process

Figure 1 encompassed both the notion that there is a two-stage process, which separates the act of idea generation and implementation, but also that these two stages might be cyclical and repeated throughout the process. It is further punctuated that ideas from another setting might be adopted and that such a successful implementation is regarded as an innovation. Moreover, the four factors investigated in this study have been identified in this framework with potentially different impact on the idea generation stage and the implementation stage. The next section of this paper provides definitions and more thorough descriptions of these four contextual factors.

Constructive Controversy

Communication between individuals possessing diverse information, perspectives and opinions, have been hypothesized as a vital prerequisite for both organizational creativity and innovation (Gilson, 2002; Kanter, 1988; Pelz & Andrews, 1996; Tjosvold & McNeely, 1988; West, 1990). However, it has also been noted that an intensified communication level often leads to conflicts between the involved parties (Mumford et al., 2002; Swann et al, 2003; Shalley and Gilson, 2004). Still on a general level, conflicts have been interpreted as potential facilitators of creativity and innovation (Baron, 1990). It is assumed that conflicts may bring hidden problems to the surface and in that sense initiate change. The mere process of disagreeing and debating might also lead to a broader discovery of different ideas and solutions (Tjosvold et al, 1986). A necessary condition is that conflicts have a task focus rather than a personal orientation (West et al., 2004). Task conflict can be defined as “*an awareness of differences in viewpoints and opinions about a task. It includes constructive challenges to the group’s performance*” (West et al., 2004, p. 288). Tjosvold et al. (1986) have presented the concept constructive controversy as an approach to handle such task related conflicts effectively. The approach is characterised by a skilled discussion of opposing positions where the persons involved view their context as cooperative. This implies that they have an understanding of a mutually beneficial goal that they can reach by influencing each other instead of competing or dominating, and finally that their personal competence is confirmed rather than disconfirmed. These interaction behaviours were found to be positively associated with self-reported creativity in a study by Tjosvold and Neely (1988). Constructive controversy has also more generally been found to contribute to successful decision-making (Tjosvold et al., 1986). In a study by Gilson (2002) it was hypothesized that constructive controversy would moderate the relationship between support for innovation and the innovation level. The moderation effect did occur, but the interaction between support for innovation and constructive controversy did not operate as expected. Moreover, the findings indicated that support for innovation and the rated innovation level was weaker under conditions of high constructive controversy than under conditions of low constructive controversy (Gilson, 2002). Gilson describes his finding as counterintuitive, but suggest that the use of constructive controversy possibly will increase the critical evaluation of ideas and reduce the number of those actually implemented. Even though this is a plausible explanation, an additional theory is presented here. While constructive controversy creates a collaborative and safe climate for suggesting new ideas, the approach will stalk the innovation process by causing long debates on matters where the authority of technical insight and expertise can

facilitate the process more. Accordingly, the factor is predicted to have a more beneficial impact on the idea generation stage than on the implementation stage.

Hypothesis 1; Constructive controversy is strongly associated with creativity and moderately associated with innovation.

Access to Resources

The centrality of resources has been related to both creative and innovative work. Time and collegial expertise, in addition to appropriate equipment and financial support have particularly been identified as important resources for this form of enterprises (Shalley & Gilson, 2004).

Time as a resource: Within creativity research the notion that creative endeavours takes time has been established through case studies on the work of grand men such as William Wordsworth, Charles Darwin, and John Locke (Gruber and Davis, 1988). A field study conducted by Amabile and Gryskiewicz (1989) within R & D units, do however provide support for the notion that time is needed for creative work also amongst more “ordinary” people. The researchers who participated in this study, pointed at sufficient time to play with ideas and explore different approaches as inductive for their creative performances. Shalley and Gilson (2004) have further remarked that managers have a complex task in providing *enough* time for creative work, implying that too much might lead to boredom and decreased motivation. The aspect of time has moreover been emphasized in relation to idea implementation. Since innovations may vary on a continuum from the rather minor adaptations to the truly radical, West (2002: 357) has punctuated that “*some innovations can be introduced in the space of an hour, while others may take years*”. The importance of time does however not only involve a sufficient quantity. The opportunity to work concentrated and uninterrupted is further related to a specific quality of time. This factor was reported as crucial in a study by Katz and Allen (1988) involving engineers who worked on developing technological innovations.

Material resources: The importance of access to material resources seems evident for most types of innovations, but presumably less authoritative for creativity since the process is cognitive and abstract in itself. On the other hand, one can argue that to provide sufficient time for creative thinking will have economical implications for the company, and that material resources in that way are attached to time. It has further been noted that a situation

lacking of resources can enhance creativity because not having everything conveniently at hand, might challenge employees to think more creatively (Shalley & Gilson, 2004). Research on this aspect in relation to innovations also suggests that the amount of resources should be balanced. In a study by Nohira and Gulati (1996) they pose the question “*is slack good or bad for innovation?*” Slack is defined by these researchers as “*the pool of resources in an organization that is in excess of the minimum necessary to produce a given level of output*” (Nohira & Gulati, 1996, p. 1246). Their findings indicate that such an excess of resources can be inductive for experimentation but negatively influence the selection of projects that are worthy and promising. They therefore conclude that an intermediate level of slack is optimal for innovations. Understanding the innovation process as interpreted by Paulus (2002) where several implementation attempts most likely will take place, the need for a good margin of resources seems vital in order to reach a successful application. Kanter (1988) refers to findings that further punctuate this debate. She more specifically points at a pattern of technological innovations as more frequent when resources are copious, while administrative innovations occur more often when resources are scarcer.

Varying expertise and skills as a resource: As mentioned above, an organization consisting of people with varied backgrounds and expertises has also been regarded as important for both creativity and innovation (Siegel & Kaemmerer, 1978; Mumford et al., 2002; Shalley and Gilson, 2004). This notion is referred to as the *value in diversity-hypothesis* due to the inconsistent nature of the empirical findings (Mumford et al., 2002; Swann et al, 2003). Even though interaction with colleagues and other professionals with varying knowledge and expertise can be seen as a central resource for creative and innovative performances, a side effect has been identified in the form of increased conflicts and stress (Mumford et al., 2002; Shalley and Gilson, 2004; Swann et al, 2003). At the same time, it has been remarked that the origin of many of the best ideas is either interdisciplinary or interfunctional (Kanter, 1988). Kanter (1988) further states that isolation of employees, tends to decrease the idea generation because the pool of different perspectives and approaches will be more astringed. Pelz and Andrews (1966) conducted a set of studies involving the work of scientists, and found that those who generated the most creative contributions had a higher frequency of contacts outside their own field. More directly, the most creative ones tended to interact with people who had other opinions and beliefs. It should be noted that “diversity” in their investigations is not primarily referring to inter-individual characteristics. They moreover demonstrated that an individual holding different functions and engaging in several fields will have higher performance rates.

While the resource intensive nature of most types of innovations seems authoritative, the need for resources appears to be more ambiguous in relation to creative work. Time is an aspect with potential significance but must be neatly balanced. Further, the literature holds little information on what sort of material resources that have proved to enhance the creative process. The contribution from people with various backgrounds and skills might be inductive for creative work, but also has a cost. Since the idea generation stage here is anticipated to encompass more critical evaluations and feedback on an individual level with a potentially higher propensity of conflicts that might be perceived as personal, opposing views are assumed to be more problematic on this stage than on the implementation stage. Taking these different aspects together, the various resources are predicted to be more crucial for innovations than creativity.

Hypothesis 2. Access to resources is strongly associated with innovation and moderately associated with creativity

Risk Tolerance

Creative and innovative work has been acknowledged as *risky ventures*, where uncertain outcomes often may entail failures (Mumford et al., 2002). It has therefore been stressed in the literature that the pursuit to find novel and better solutions will both encompass a willingness to take risks (Dewett, 2006) and a tolerance for failures (Mumford et al., 2002). The concept has been defined as *the extent to which there is uncertainty about whether potentially significant and / or disappointing outcomes of decisions will be realized* (Sitkin & Pablo, 1992, p.10). The definition identifies outcome uncertainty as a key factor in relation to risk, which is on most part linked to a lack of knowledge concerning the distribution of potential outcomes (Sitkin & Pablo, 1992). In a study conducted by Caldwell & O'Reilly (2003), both the level of support for taking risks and the tolerance for mistakes were investigated. Innovation was measured through team-member ratings. The results indicated a positive correlation for both aspects. The researchers thereby conclude that when a team upholds norms which encourage risk taking and accepts mistakes, the employees will be more willing to involve in novel and original problem-solving. In a recent study by Dewett (2006) the willingness to take risks was hypothesized as a possible link between work context, creativity relevant individual characteristics, and creative performance. Creativity was also in

this study measured through supervisory ratings. The results supported the notion that creative efforts are perceived by the employees as risky. Furthermore, their willingness to take on such risks was related to their rated level of creative performance (Dewett, 2006). Shalley and Gilson (2004) have commented that the social climate in organizations, often is described in line with the cultural dimensions presented by Hofstede (2005). They suggest that the cultural dimension *uncertainty avoidance* may have a key role for creativity by creating a platform for higher risk tolerance. The content of this dimension is defined by Hofstede (2005) “*as the extent to which a culture feel threatened by ambiguous or unknown situations*”. Nakata & Sivakumar (1996) have proposed that the level of uncertainty avoidance may function differently on the stages of the innovation process. While low uncertainty avoidance is interpreted to be most beneficial for the generation of ideas, higher uncertainty avoidance might facilitate implementation due to the need for structure and planning on this stage. The positive impact for low uncertainty avoidance at the first stage, are also by these researchers related to a higher willingness to take risks. Synthesizing these arguments and findings, a certain tolerance for risk is anticipated to benefit both creative work and innovation. A high risk tolerance seems vital in order to pass the barrier of reluctance to express a potentially odd or unpopular idea. There might however be a limit for the beneficial impact of willingness to take risks on the implementation stage; too hazardous investments might as a worst-case scenario lead to bankruptcy if a successful innovation is not achieved. It is therefore predicted that the idea generation stage will benefit from a higher portion of risk than the implementation stage.

Hypothesis 3; Risk tolerance is strongly associated with organizational creativity and moderately associated with innovation.

Leader-Member-Exchange (LMX)

Leadership may potentially have a significant influence on the creative and innovative performances in an organization (Mumford & Licuanan, 2004; Scott & Bruce, 1994). While earlier theories on leadership predominantly have focused on characteristics related to either the leader or the situation, the theory of leader-member-exchange directs the focus at the relationship and interaction between the leader and the employee (Graen & Uhl-Bien, 1995). According to this theory, effective leadership processes are characterized by a mature relationship or partnership between the leader and the employee where the parties can count

on each other's loyalty and support (op cit.). Research on the quality of the relationship provides correlations with several different indicators of organizational efficiency (Graen & Uhl-Bien, 1995). Moreover, Tierney et al. (1999) have identified a number of aspects related to the LMX-theory that might be conducive for creative performances. They point out that the high quality of the leader-member relationship should create a level of comfort and trust which they characterize as necessary for creativity (op cit). They further refer to research which indicate that employees in high LMX relationships are involved in more complex and challenging tasks, and that they are more likely to engage in risk taking. In a study brought out by Tierney et al. (1999) within the R & D section of a chemical company, LMX was found to be positively related to employee creativity as rated by their supervisors.

The quality of the exchange between the leader and the employee has also been tested in relation to innovations. According to Scott and Bruce (1994), this type of leadership style can be anticipated to facilitate innovative work because the interaction with the leader is characterized by a higher level of autonomy and decision latitude (Scott and Bruce, 1994). In a study within a R & D department, these researchers found that high LMX influenced the innovation level. More specifically, the results revealed that the quality of the exchange was both related to the rated innovativeness, and the perceived support for innovation.

In these studies connecting LMX to respectively organizational creativity and innovation, the arguments for doing so are different. While comfort and trust is a central argument for expecting high LMX to promote creative work, autonomy and decision latitude is the main rationale for expecting high LMX to have a positive effect on the implementation stage. Several studies have furthermore established the need for autonomy and decision latitude for creative work (Oldham and Cummings, 1996; Siegel and Kaemmerer, 1978; Mohammed, 2002; West et al., 2004). Hence, the existing body of research can be interpreted to give a fuller support for the notion that LMX incorporates aspects that will induce creativity, and the following hypothesis is thus presented here:

Hypothesis 4; LMX is strongly associated with organizational creativity and moderately associated with innovation.

METHOD

Sample, Procedure and Settings

Ten companies participated in this study, all situated in the region of Emilia Romagna in Northern Italy. They were recruited with the help from an organization that works to promote innovation for small and medium sized companies in this region. Most of the companies that participated had earlier received a prize from this organization on their ability to innovate. The sample consisted originally of 158 employees, and one managerial representative from each of the companies. Due to a low disclosure rate and other irregularities in the reports, one of the firms with a total of 8 participants in addition to their managerial representative, were removed from the analysis. The actual number is therefore 150 employees and 9 managerial representatives. All respondents were informed that the data collections were part of a study on organizational creativity and innovation, and that the disclosed information would be anonymous. The sample consists of 88 males and 60 females, while 2 of the participants did not disclose their sex. This sample consists of a constellation of young workers where 36% of the respondents are in their twenties and 45% are in their thirties, 11 % of the employees are in their forties, 7,3 in their fifties, and the remaining 0,7% are in their sixties. 53% of the respondents have finished high school, 27% have a bachelor's degree, and 4% of the employees have a master's degree. The data collection took place from September – December 2006.

Measures

A questionnaire regarding organizational creativity and innovation was constructed in a collaborative project between Innovasjon Rogaland and the University of Stavanger in 2006. The questionnaire consists of the following five sections and has a total of 118 items: **1.** A fundament for creativity and innovation – job characteristics and tasks. **2.** Processes which influence creativity/ innovation – the social context. **3.** Leader support for creativity and innovation. **4.** Individual factors. **5.** Evaluation of creativity and innovation within the department. The six scales used in the study reported here, derives from this questionnaire. The scales – some originally developed in Norwegian by associate professor at the University of Stavanger Gro Ellen Mathisen, and some selected from other existing work, were translated into Italian at the Section of Italian Studies, University of Bergen, and thereafter revised at the

Faculty of Psychology, University of Bologna. The assessment tool is still under development, and the different scales have therefore been revised through the analysis in this study. An answer for every item in this questionnaire was indicated on a 7 point Likert-type scale ranging from “strongly agree” to “strongly disagree”, or “never” to “very often”. An additional questionnaire directed at possible objective measures of innovation was developed by G. E. Mathisen within the same project. The questionnaire is designed as a report for the departmental leader, who is asked to enclose information regarding the number of various types of innovations that the company (or one department within the company) has developed and implemented within a defined period. Also this questionnaire was translated into Italian at the Section of Italian Studies, University of Bergen, and thereafter revised at the Faculty of Psychology, University of Bologna.

Access to Resources was measured using seven items to assess to what extent the employees had sufficient access to equipment, discussion partners, time and information in order to fulfil their tasks. The items were developed by G.E. Mathisen. The participants indicated the extent to which they agreed or disagreed with formulations such as “I have access to sufficient technical competence for elaborated work on ideas” and “I have access to sufficient equipment to effectively execute my work”. A principal components factor analysis indicated a one factor solution. Cronbach’s alpha was .83.

Constructive controversy was measured using a 12-item scale developed by Tjosvold, Wedley, & Field (1986). Due to a low Cronbach’s alpha for this scale, a factor analysis was applied. Three factors were extracted. The principal factor included 6 items formulated in a positive direction i.e. “Everyone’s opinions are heard even if they differ from the majority’s” while the second factor included 3 negatively formulated items i.e. “Some try to control others”. The third factor included 2 items with high loadings on factor one or factor two. One item did not have high loadings on any of the factors. Based on these findings, the items that constituted factor 1 were selected for further use in the present study. Factor 2 was excluded due to the solely negative value and factor 3 was excluded due to the extensive overlap with the other factors. The scale comprises statements characterizing how apposing views and opinions are handled in the work environment. The statements are categorized as either describing a cooperative, controversial, confirmative or differentiated approach. The employees indicated how well the statements described their own environment. Examples are “We search for solutions that are good and acceptable to all” and “We feel that we are

understood and accepted by each other”. Cronbach’s alpha was .86 for this scale within this study.

Risk tolerance was measured using a five-item scale where three of the items were selected from Caldwell and O’Reilly (2003) and two from Dewett (2006). A factor analysis indicated that just two of the items should be kept to assess the tolerance for risk within this sample, both deriving from Caldwell and O’Reilly. The participants were asked to indicate to what extent they agreed or disagreed with the following two statements describing their personal attitude towards risk and the established norms towards risk in the organization; “Risk taking is encouraged around here” and “I will take informed risks at work in order to get the best results, even though my efforts may fail. Cronbach’s alpha was .64 for this scale in the present study.

Leader-member-exchange. A 6-item measure selected from Graen, Novak, and Sommerkamp (1982) was used to assess the quality of the relationship between the leader and the employees. A factor analysis indicated one factor, while the reliability analysis clearly indicated that one item should be removed. 5-items were therefore kept for further analysis. The respondents indicated to what degree they agreed with statements such as “My leader acknowledges my skills” and “I believe my leader would have helped me out of a difficult situation even if it had some negative consequences for him/her”. Cronbach’s alpha was .85 for this scale in the study presented here.

Creativity Evaluation Measure. The employee perceived level of creativity in the organization was measured through one item developed by G.E. Mathisen. Creativity was defined and distinguished from innovations in the following manner: “The essence of creativity is to produce novel ideas, while innovation essentially is to put these ideas into practical use”. The employees were hence asked to give an overall evaluation of the creativity level within their department/group. More specifically the participants were asked to indicate to what extent they agreed or disagreed with the statement “All in all, I regard my department as being creative.

Innovation Evaluation Measure. This scale originally consisted of six items adjusted from the work of Scott and Bruce (1994). On the basis of both reliability and factor analysis, one item was removed. After this modification the cronbach's alpha was .85. Through this measure the employees were ask to indicate the frequency of certain activities in their organization related to implementation and application of ideas. Examples of statements are "We develop adequate plans and schedules for the implementation of new ideas" and "We investigate and secure funds needed to implement new ideas". In the study conducted by Scott and Bruce (1994), assurance of the validity of the scale was obtained through positive correlations with an objective measure of the innovative history (from the organization's archives) for each of the participants. In the present study the number of reported innovations were included to evaluate to what extent the measure corresponds with a more objective measure of innovation.

Number of innovations within 6 different areas were reported by a managerial representative from each of the companies. Drawing on the work by Mohammed (2002), the following types of innovations were defined by Gro Ellen Mathisen: service -, process-, administrative-, product, operational and marketing innovations. The managers were asked to report how many successful implementations the company had brought out since January 2005.

RESULTS

Correlations

Table 1 presents the summary statistics and zero-order correlations between the different constructs included in the present study. The bivariate relationships indicated that the dependent variables were significantly related to both the evaluated creativity and innovation. LMX was the study variable most strongly related to both the employee perceived creativity an ($r=.36$, $p < .001$) and innovation($r=.25$, $p < .01$), while access to resources was the only variable related to number of innovations ($r=.19$, $p < .05$). There was a strong correlation between respectively creative and innovative behaviour ($r= .51$, $p<.001$).

Table 1
Means, standard deviations, and correlations for study variables

	Mean	SD	1	2	3	4	5	6
1. Access to resources	5.20	1.05						
2. Risk tolerance	4.86	1.51	.14					
3. Constructive controversy	5.33	1.23	.51***	.22**				
4. Leader-member-exchange	5.02	1.34	.36***	.25**	.41***			
5. Creativity Evaluation	5.31	1.51	.20**	.27**	.43***	.45***		
6. Innovation Evaluation	5.44	0.96	.38***	.24**	.33***	.36***	.51***	
7. Number of Innovations	1.91	1.19	.19*	.11	-.03	.00	.01	.13

*p<.05

**p<.01

***p<.001

Testing for Differentiating Effect on Predictors of Creativity and Innovation

Multiple linear regression analyses were applied to test whether the study variables had a differentiating effect on creativity and innovation. Table 2 shows the results of the multiple regression analyses. Four factors were measured for the employee perceived creativity and innovation and for the reported number of innovations throughout the last year. The results showed that there was a significant positive effect for access to resources on both the evaluated innovation level ($\beta=.25$, $p < .01$) and the reported number of innovations ($\beta=.29$, $p < .01$), while no effect was found on creativity ($\beta=-.09$). The strongest effect in the analyses was found for constructive controversy on creativity ($\beta=.34$, $p < .001$). The factor had no effect on the evaluated innovation level ($\beta=.08$) but a significant negative effect on number of innovations ($\beta=-.22$, $p < .05$). Moreover, LMX showed a strong positive effect on creativity ($\beta=.31$, $p < .001$), the factor also showed a positive effect on the evaluated innovation ($\beta=.20$, $p < .01$), but had no effect on number of innovations ($\beta=-.04$). Lastly, risk tolerance had an equally positive effect on both creativity ($\beta=.18$, $p < .05$) and the evaluated innovation ($\beta=.18$, $p < .05$), the factor did however not show a significant effect on the reported number of innovation ($\beta=.13$). In a study with such a small sample size, risk tolerance can though be interpreted to have some effect on number of innovations.

Table 2
Summary of results of regression analyses

	<u>Creativity</u> <u>Evaluation</u>		<u>Innovation</u> <u>Evaluation</u>		<u>Number of</u> <u>Innovations</u>	
	β	$R^2=.33$	β	$R^2=.23$	β	$R^2=.08$
Access to resources	-.09		.25**		.29**	
Risk tolerance	.18*		.18*		.13	
Constructive controversy	.34***		.08		-.22*	
Leader-member-exchange	.31***		.20*		.04	

* $p < .05$
** $p < .01$
*** $p < .001$

DISCUSSION

The present study addressed the need for demarcated operationalizations of creativity and innovation by testing the effect of four factors on measures of creativity and innovation. Though these factors previously have been described in the literature as antecedents of both creativity and innovation, the results indicate that the factors might have a differentiated impact on the two phenomena.

The study described and examined a framework where the idea generation stage was characterised by the willingness of the individual employee to engage in a task that might be personally challenging, while the implementations phase was distinguished as more dependent on appropriate equipments and technical insights. The presented framework is to a large part supported by the results of this study. The variable constructive controversy showed the overall strongest effect in the study as a predictor of creativity. The variable did not have any effect on the innovation measure reported by the employees, but showed a negative effect for the number of innovations reported by the managerial representative. This latter finding

concurr with a study conducted by Gilson (2002). As previously cited, Gilson perceived the finding as counterintuitive but suggested that a more critical approach could decrease the amount of ideas that the employees found worthy for further work and implementation. This interpretation implies that constructive controversy might not have positive effect on the quantity of innovations but that the quality potentially might be higher. His rationale could be interesting to explore further since constructive controversy has been found to have a positive effect on decision-making (Tjosvold et al., 1986). In order to assess the impact of such a distinction between quantity and quality of innovations, one would need to know more about the consequences of innovations for organizations on an overall level. Damanpour (1990) has remarked that empirical studies regarding such consequences are scarce.

Consistent with predictions, the present study supports the notion that access to resources is authoritative on the implementation stage. More specifically, a next to equally strong effect was found for this aspect for both the innovation evaluation given by the employees and the reported number of innovations, demonstrating the centrality of this aspect for innovations. The variable did however not have an effect on creativity. Time and discussion partners were anticipated to somewhat influence the level of creativity. It was however also anticipated that the cost of conflicts and disagreement might have a stronger negative impact for the generation of ideas than the implementation drawing on the assumption that posing new ideas is a more personally challenging act. Moreover, in light of the inconsistent results for the “value in diversity”- hypothesis, it might also be that the best ideas more often derive from individuals rather than the group. This aspect can be seen in relation to the study by Pelz and Andrews (1966) where a positive effect of *diversity* was primarily connected to an individual level characterised by diverse functions and high exposure to various fields. It was further noted that the aspect of time must be elegantly balanced in order to give enough time for idea generation rather than too much which can lead to boredom and decreased motivation (Shelley & Gilson, 2004). It is therefore likely that variations on both an individual level and characteristics regarding group dynamics might influence the perception of time needed for idea generation.

Regarding tolerance for risk, it was anticipated that this factor would be more vital and inductive for posing new and potentially unpopular ideas, while the implementation stage would benefit from a more moderate tolerance for risk in order to ensure structure and economical responsibility on this stage. The results reported here showed however an equally

strong effect for this factor on the employee evaluation for both creativity and innovation. This factor did not show a significant effect on the reported number of innovations, but the result was not dramatically weaker than for the other two measures. Taken together, it can therefore be concluded that the willingness to engage in risk is a common necessity for both idea generation and successful implementation, but that the propensity could preferably be higher on the idea generation stage than on the implementation stage, in line with the framework presented here.

Leader-member-exchange showed the second overall strongest effect in this study as a predictor of creativity. This factor also had a significant effect on the employee evaluation of innovation but not for the reported number of innovations. Within the framework described above, it was predicted that the quality of the relationship between the employees and the leader would have a moderate effect on the innovation level. The main rationale for this differentiation was that high leader-member-exchange characterized by a high level of trust and confidence building, might be more authoritative for the willingness to pose ideas than for the ability to find suitable applications. It was however noted that high employee autonomy and decision latitude, which also is connected to this form of leadership approach, could be inducive at the implementation stage. This latter aspect was consequently only partially supported in the study reported here, and additional studies designed to investigate the effect of LMX on objective measures of innovation is needed.

Although a dominant part of the literature define creativity and innovation as separate aspects; to my knowledge, the present study is the only one that so far has empirically investigated to what extent this might have explicit implications for what contextual factors that need to be given particular attention in the idea generation phase, and which ones should be intensified through the implementation phase. The agenda here is not to imply that the two phenomena are unrelated. In fact, the analysis in the study presented here, showed a strong correlation between the creativity and innovation measure. However, the notion that the two phenomena also may occur independent of one another, should neither be overlooked nor underemphasized. There are reasons to believe that many organizations are able to generate new ideas without actually bringing them into use. Moreover, ideas that were developed outside the organization can be implemented and acknowledged as an innovation if they are novel in that particular setting. This aspect punctuate, in my view, why a direct transfer of

results brought out on either creativity or innovation might create a dim and misleading picture of how the process really unfolds.

Like all research, the contributions of this study can only be assessed in light of its purpose and methods. The study is not without limitations. One limitation is the relatively small sample size consisting of 150 employees. The sample size has both implications regarding generalizability and the power of the statistical testing. This last aspect is more precisely related to a lower probability of rejecting false null hypotheses than for tests with a larger sample and consequently higher statistical power (Gilson, 2002). It must further be noted that creativity was assessed using a one-item measure. The assessment tool has other items measuring the creativity level. It was however, necessary to include just this single item in the analysis since the focus for this study was on the departmental level while the additional items measured other levels in the organization. Another aspect that can be taken into consideration is that most of the previous studies conducted within the area of creativity and innovation, predominantly are brought out within a North American, Anglo-Saxon perspective and setting (Anderson et al., 2004). Since innovation processes are likely to unfold differently across cultures (Anderson et al., 2004) it can be noted that the current study was brought out within a South European context. Due to cultural differences on a national level as described by Hofstede (2005) and House et al. (2004), the factors investigated here might have different meanings and implications within an Italian setting. In order to explore such aspects further, comparative analyses between different national settings are needed. A strength of this study is however the inclusion of a sample that has extensive experience in producing innovative outcomes. In fact, 8 of the 9 firms had received official recognition on their ability to innovate prior to this study. This implicates that the participants have hand-on knowledge regarding how creative and innovative work unfolds in organization, and that their evaluations of the factors examined in this study are worthy of attention and reflection.

CONCLUSION

The results of this study contribute to the research field of organizational creativity and innovation by demonstrating a baseline insight; idea generation and idea application is not necessarily promoted by the same factors. Researchers should therefore attempt to distance themselves from directly transferring empirical findings involving either of the two phenomena. In particular, the aspect of resources appear, according to the results reported here, overly emphasized in relation to creative work, and perhaps not fully espoused in relation to innovations. The “want is the mother of invention” – view on the origin of innovations may even be interpreted as a result of the lacking demarcation of the two concepts: what it really infuses is the level of creativity but in order to bring a promising idea to life, a proper amount of resources is still required. A concrete implication for organizations today is to revise or reconsider whether their investments are adequate on the implementation stage. The need for emotional support and a low threshold for suggesting radical or controversial approaches will at the same time be of vital importance on the idea generation stage. An underpinning notion here is therefore to keep an eye on the different stages of the process. It is of potentially minor importance whether the process unfolds as an orderly two-staged or cyclical, and more authoritative to acknowledge that the generation of ideas has a different nature than the application, and to adjust the appropriate support accordingly.

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APPENDIX I

Items in Italian

Access to Resources

1. Ho tempo a sufficienza per apportare nuove idee o miglioramenti
2. Ho le risorse necessarie per svolgere i compiti del mio lavoro
3. Ho possibilità di discutere i differenti aspetti del lavoro con altri colleghi
4. Ho gli strumenti necessari per portare a termine i miei compiti
5. Dispongo delle informazioni necessarie per portare a termine i miei compiti
6. Ho la possibilità di accedere alla necessaria competenza tecnica per sviluppare le mie idee
7. Si possono ottenere risorse aggiuntive per sviluppare idee che sembrano promettenti

Risk Tolerance

1. In questa organizzazione si viene incoraggiati a tentare nuove idee che implicano rischi
2. Sono disposto ad assumere dei rischi per ottenere risultati migliori, anche se questo potrebbe farmi sbagliare
3. E' normale fare degli errori quando si cerca di fare qualcosa di nuovo
4. In questa organizzazione è considerato normale che, nel tentativo di fare qualcosa di nuovo, si commettano degli errori
5. In base alla mentalità dell'azienda si preferiscono soluzioni sicure piuttosto che scelte che implicino un certo rischio

Constructive Controversy

1. Nel reparto ogni lavoratore esprime liberamente le proprie opinioni
2. Si dà ascolto alle opinioni di tutti anche di quelli che differiscono dalla maggioranza
3. Punti di vista diversi portano ad una valutazione più attenta
4. Nel reparto c'è spirito di gruppo
5. Ci sentiamo reciprocamente compresi e accettati
6. Nel reparto ci influenziamo a vicenda
7. C'è chi cerca di prevalere e far passare le proprie idee
8. Essere in disaccordo con una persona non porta ad isolare quella persona
9. C'è chi cerca di esercitare il proprio controllo sugli altri
10. Tendiamo ad incolparci reciprocamente di errori fatti
11. Cerchiamo soluzioni che siano buone o accettabili per tutti
12. Nel nostro reparto c'è la volontà di cercare un compromesso

Leader Member Exchange

1. Solitamente so quando il mio superiore è soddisfatto per il lavoro che ho fatto
2. Il mio superiore conosce quali sono i miei problemi e i miei bisogni sul lavoro
3. Il mio superiore riconosce le mie capacità
4. Penso che il mio superiore userebbe la sua posizione per aiutarmi nella soluzione di problemi sul lavoro
5. Penso che il mio superiore mi aiuterebbe ad uscire fuori da una situazione difficile anche a proprie spese
6. Ho una buona relazione di lavoro con il mio superiore
- 7.

Innovation Evaluation Measure

1. Cerchiamo nuova tecnologia, nuovi metodi di lavoro, nuovi prodotti e servizi
2. Troviamo nuove idee
3. Siamo disposti a lavorare su idee che sembrano promettenti
4. Cerchiamo e ci assicuriamo le risorse e il supporto necessari per la realizzazione delle nostre idee
5. Sviluppiamo piani di lavoro adatti alla implementazione delle nostre idee
6. Realizziamo le nostre idee

Number of Innovations

Quante volte nel corso dell'ultimo anno (a partire cioè dal Gennaio 2005) sono stati introdotti nel suo reparto i seguenti tipi di innovazione?

Innovazioni di servizio:

Introduzione di nuovi tipi di servizio per far fronte alle richieste dei clienti (sia interni che esterni)

Innovazioni di processo:

Cambiamenti nello svolgimento del processo di produzione

Innovazioni amministrative:

Nuovi modi di dirigere i processi di lavoro (per esempio introduzione di nuovi strumenti per la direzione, nuovi sistemi di valutazione o nuovi sistemi di ricompensa)

Innovazioni operative:

Nuovi metodi, soluzioni oppure nuovi strumenti per cambiare o migliorare l'esecuzione del lavoro

Innovazioni di prodotto:

Produzione di nuovi prodotti nuovi nel suo reparto oppure significativi miglioramenti di prodotti già esistenti

Innovazioni di "marketing":

Nuovi modi di fare 'marketing' per prodotti o servizi.

APPENDIX II**Translated Items****Access to Resources**

1. I have sufficient time to work uninterruptedly with ideas or improvements
2. I have access to sufficient resources to effectively execute my tasks
3. There are other personnel available with whom I can discuss different work issues
4. I have access to sufficient equipment to effectively execute my work
5. I have access to sufficient information to effectively execute my work
6. I have access to sufficient technical competence for elaborated work on ideas
7. Extra resources are available for further work on ideas with a promising potential

Risk Tolerance

1. Risk taking is encouraged around here
2. I will take informed risks at work in order to get the best results, even though my efforts may fail
3. Mistakes is a normal part of trying something new*
4. The attitude around here is that when you are trying out new things, mistakes are a normal part of the job*
5. In general, it is better to be safe than sorry around here*

* Item was removed before further analyses

Constructive Controversy

1. Each employee in the department fully expresses his/ her opinions
2. Everyone's opinions are heard even if they differ from the majority's
3. Diverse opinions facilitates thorough assessments*
4. We have collaborative spirit within the department
5. We feel that we are understood and accepted by each other
6. Everyone in the department influence each other*
7. Some try to win by pushing through their own original opinions*
8. To disagree with a person does not lead to that the person is rejected*
9. Some try to control others*
10. We try to put the blame on others when we fail*
11. We search for solutions that are good and acceptable to all
12. There is a great will to reach compromise within our department

* Item was removed before further analyses

Leader Member Exchange

1. I usually know how satisfied my leader is with the work I have done
2. My leader understands my work related problems and needs
3. My leader acknowledges my skills
4. I believe my leader would use his position to help me to solve work related problems*
5. I believe my leader would have helped me out of a difficult situation even if it had some negative consequences for him/her
6. I have a good work relation with my leader

* Item was removed before further analyses

Innovation Evaluation Measure

1. We are searching for new technology, new solutions, or products/ services
2. We generate new ideas*
3. We are willing to work further on ideas that might be promising
4. We investigate and secure funds needed to implement new ideas
5. We develop adequate plans and schedules for the implementation of new ideas
6. We innovate

* Item was removed before further analyses

Number of Innovations

How many of the following types of innovation have been introduced in your department within the last year? (From Jan 2005 until today):

Service Innovations:

Introduction of new types of services in order to respond to the demands of customers or clients (both internal and external)

Process Innovations:

Adjustments of the work allocations in the department

Administrative Innovations:

Novel ways of managing the work processes (ex. New management tools, new evaluation systems or new rewards systems)

Operational Innovations:

New methods, solutions or equipment to change or improve the way you perform your work

Product Innovations:

Productions of new types of products (new in your department) or significant improvements of existing products

Marketing Innovations:

New ways of marketing products or service